Space Weather Technical Forecast

Issued on Friday, 30 August 2024 at 00:23 Local

This technical forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

Space Weather Forecast Headline: M-class flares likely.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Low with a peak C7.0 flare at 28/0408 UTC from just over the southeast limb. There are nine regions currently on the disc, with AR3806 the most likely flare source. This moderately sized but compact region has some apparent complexity, with probably a delta spot. Its current location remains too close to the southeast limb to accurately assess. The other regions on the disc remain relatively simple, and mostly decaying or stable. However, a small region has emerged in the southeast quadrant and continues to exhibit slight growth.
No Earth directed CME has been observed, as although a couple of weak filament eruptions were seen from the northwest disc, just before 29/0100 UTC and around 21/0610 UTC, analysis of the imagery has been inconclusive. Late in the day a coronal dimming event occurred in the northeast quadrant, but currently no associated CME has been observed. Also, if a CME has been produced then it is unlikely to be Earth directed.

Solar Wind / Geomagnetic Activity: Solar wind parameters, as measured by ACE at L1, continued to show ongoing influence from a CME that arrived early on 27 Aug, although this influence is gradually weakening. Solar wind speeds persisted at background levels, generally between 300-340 km/s. The density was predominantly below average. The Interplanetary Magnetic Field, Bt, decreased from strong levels to become moderate, peaking at 18nT at 29/0945 UTC. The north-south component, Bz exhibited a gradual but turbulent rotation from weakly to strongly positive (northward), then gradually became weakly positive again late in the day with brief dips to become weakly negative (southward). Phi angle was negative for much of the period (towards the Sun), but temporarily became positive around the middle of the day, at the same time the Bz was strongly positive. Geomagnetic activity has been Quiet (Kp1-2).
Energetic Particles / Solar Radiation: High energy (greater than 10 MeV) proton flux observed by GOES18 remained at background. High energy electron flux (greater than 2MeV) observed at GOES16 was at background. The 24-hour fluence was below the Active threshold, with 1.09e6 integrated pfu observed at 30/0000UTC.

Four-Day Space Weather Forecast Summary

Solar Activity: Low to Moderate activity is forecast with M-class flares likely and a slight chance of isolated X-flares.

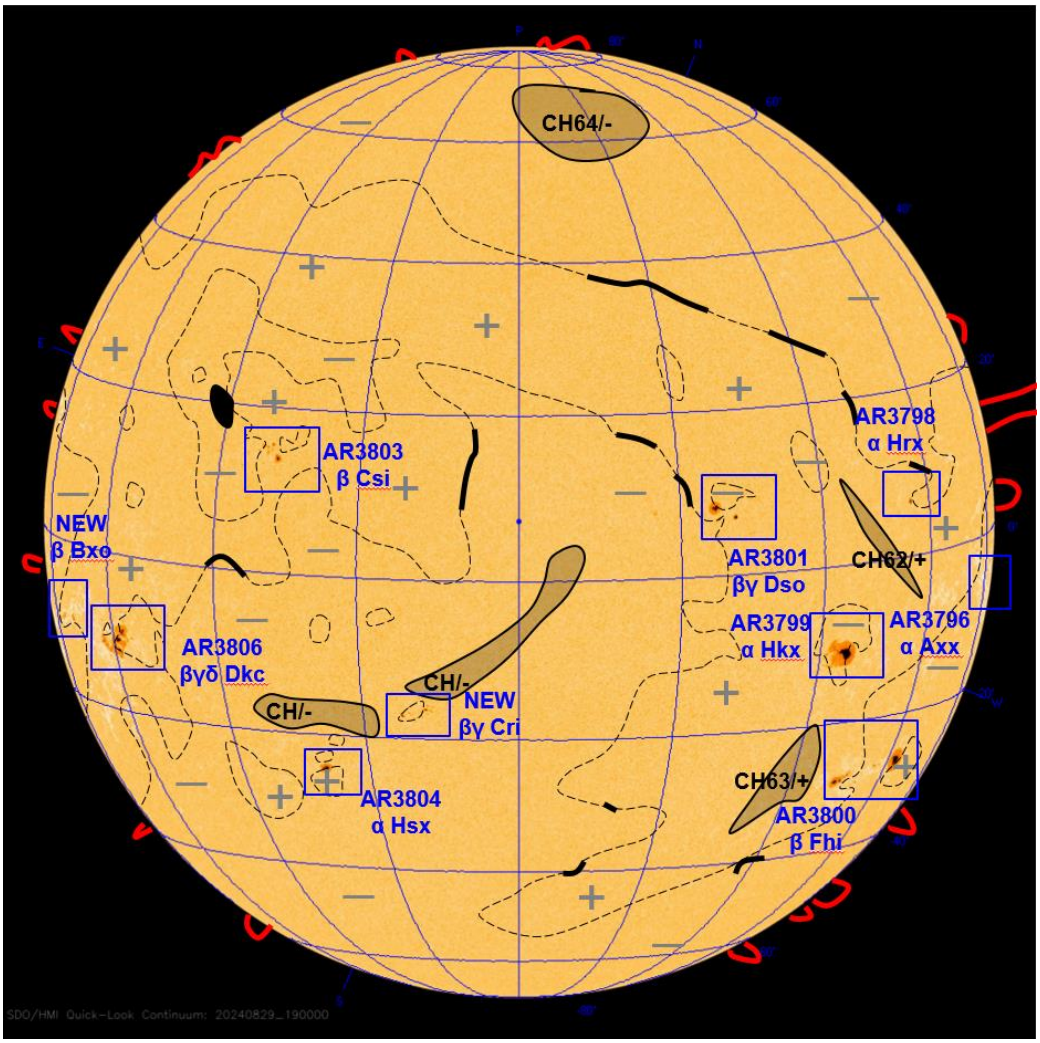
Solar Wind /Geomagnetic Activity: There are no Earth-directed CMEs. Current CME enhancement is forecast to continue to wane. However, there is a chance of temporary weak solar wind enhancements from small coronal hole 62/+ today (30 Aug), although confidence is low. Another slight solar wind enhancement, from a thin coronal hole almost centre disc, may arrive through day 4 (2nd Sept). Geomagnetic activity is expected to be mainly Quiet with isolated Unsettled intervals (Kp 1-3), although with a chance of Active (Kp 4) intervals days 1 and 4 (30 Aug and 2 Sep).

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2024. All Rights Reserved.

Energetic Particles / Solar Radiation: High energy proton flux is likely to remain at background, but with a slight chance of reaching the S1 Minor Radiation Storm level, should any larger flares occur, especially from the western disc. High energy electron flux is expected to remain at background. The associated 24-hour fluence is expected to persist below Active.

Figure 1. Solar Analysis Valid 29/1900 UTC.



Key: Filament ___ , Prominence ___ , Magnetic Field Line - - - , Polarity +/-, Coronal Holes: Grey shaded area CHxx +/-, Sunspot groups 25xx - Mt Wilson α-β-βγ-βγδ and Zurich-McIntosh Axx etc.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2024. All Rights Reserved.

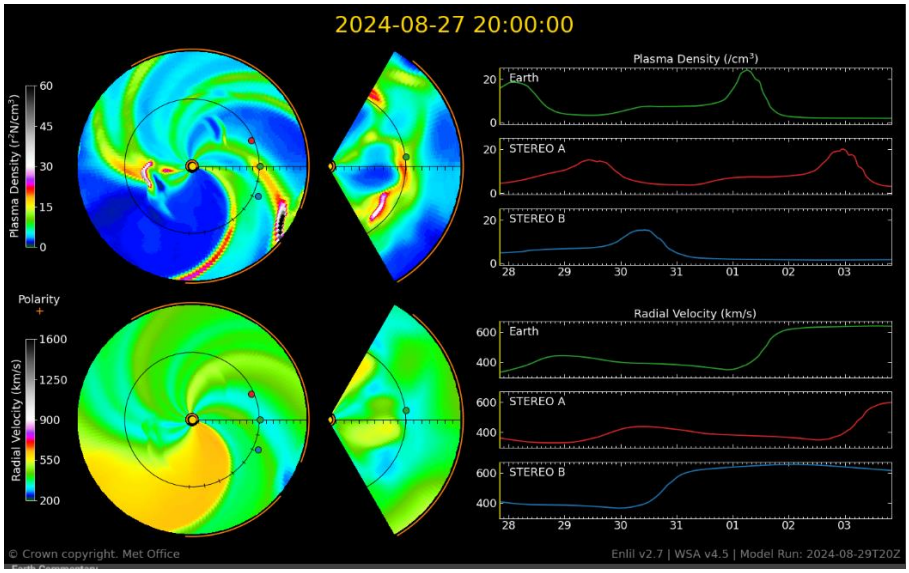
Geomagnetic Storms:

The CME that was seen leaving the Sun on 23 Aug arrived at L1 early on 27 Aug. Earth still lies within the magnetic cloud from this feature, with enhanced solar wind parameters that are expected to ease over the coming 12 hours. There are no other Earth-directed CMEs.
The fast wind from small coronal hole 62/+ has the potential to give a slight enhancement to the solar wind at times today (30 Aug), perhaps reaching slightly elevated levels with speeds around 400-450 km/s. However this coronal hole was not clearly present in imagery on the previous rotation, with the solar wind parameters contaminated by previous CME impacts. MOSOWC Enlil also suggests any enhancement would have been on 28 Aug, further reducing confidence. The central disc coronal hole, currently unnumbered, is now signalled to bring associated fast wind enhancements through day 4 (02 Sep), although any HSS could possibly arrive late day 3 (01 Sep) with speeds around 500 km/s.

Geomagnetic activity is expected to be mainly Quiet with isolated Unsettled intervals (Kp 1-3), although with a chance of Active (Kp 4) intervals days 1 and 4 (30 Aug and 2 Sep).

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	5	5	5
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Figure 2: Latest MOSWOC Enlil,



Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

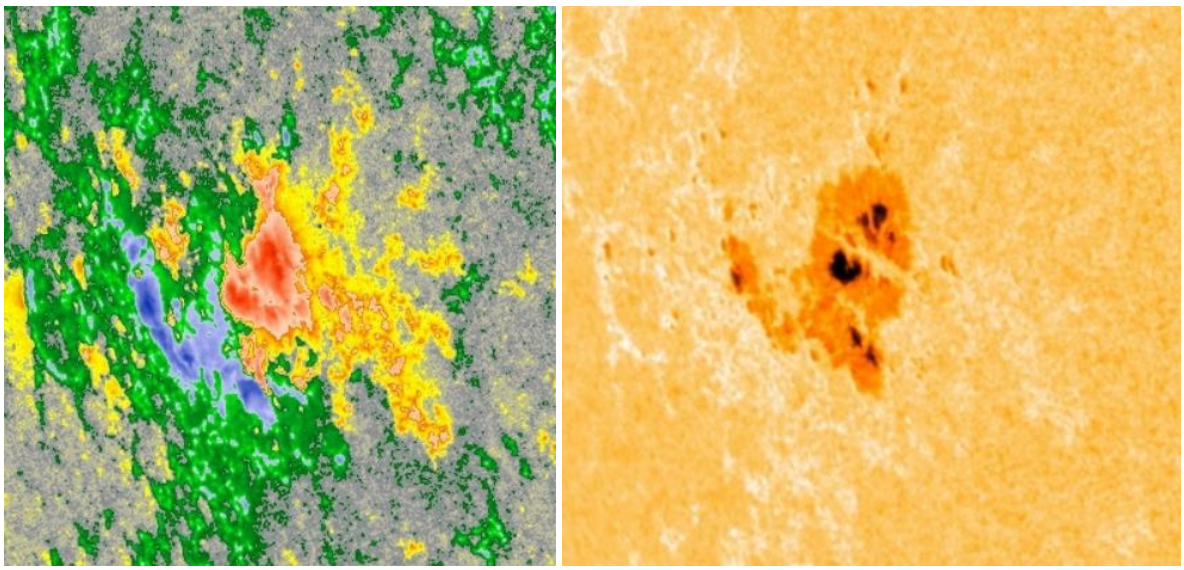
© Crown Copyright 2024. All Rights Reserved.

Radio Blackouts - X-Ray Flares:

There are nine sunspot regions visible, as previous region AR3796 has now rotated onto the west limb. AR3806 in the southeast remains the most complex, as a modestly sized and compact but rather ragged region, with surrounding plage, and a delta spot. There appears to be a north-south alignment to the delta spot, which may increase the instability of the region. A new weak spot is closely following this region. AR3800 in the southwest has shown slight decay recently, with small intermediate spots fading. AR3801 has also seen some slight decay, with trailer spots barely visible, but just maintains a beta-gamma configuration. AR3803 has also seen some small weak trailer spots fade. The only region to show development is a new small region in the southeast, which has emerged with rudimentary penumbra on a trailing spot. Activity is Low with a peak C7.0 flare at 29/0418 UTC perhaps from the new region, yet to rotate onto the disc, from over the southeast limb. Low to Moderate activity is expected with M-class flares likely and a slight chance of isolated X-flares, with AR3806 the most probably source.

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	No	55	55	55	55
Very Active	R3 to R5 X Class	No	5	5	5	5

Figure 3: Latest SDO/AIA images of AR3806 (left magnetogram and right flattened intensitygram).



Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2024. All Rights Reserved.

Solar Radiation Storms - (High Energy Protons):

High energy proton flux, as observed by GOES-18, is currently at background levels and is likely to persist at this level. There are a number of moderately sized sunspot regions in the western hemisphere which is a more favourable position to give proton enhancements at L1, should any significant flares occur. However, these regions currently lack magnetic complexity. Consequently, there is currently a slight chance of exceeding the S1/Minor Radiation Storm threshold through this period.

Radiation Storms	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	10	10	10	10
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

High Energy Electrons Event (≥ 2MeV):

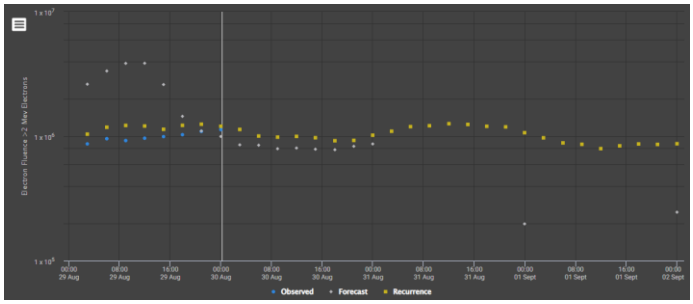
High energy electron flux as observed by GOES-16 is currently at background. No significant wind speed increases are anticipated, in the period with any coronal hole sourced enhancements expected to be weak. However, the recent coronal mass ejection arrival may have resulted in an increase in electron counts at lower orbits, which have the potential to relax toward GEO. Background flux is most likely to continue but with a chance of periods of Moderate at diurnal max.
Fluence is expected to remain below the Active (1e8 integrated pfu) threshold through the period, with MOSWOC REFM currently giving good guidance.

GEO Electron Environment	Level (cm^{-2} sr^{-1} day^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ 2 MeV ≥ $1x10^8$	No	1	1	1	1
Very Active	≥ 2 MeV ≥ $1x10^9$	No	1	1	1	1

Figure 4: Latest MOSWOC REFM.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2024. All Rights Reserved.



Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2024. All Rights Reserved.